

REMARKS

Claims 1, 3-9, and 32-34 are now pending in the application. By this amendment, claim 1 has been amended to include the subject matter of claim 2. Accordingly, the amendment of claim 1 does not raise a new issue that requires further consideration and/or search. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 1-9 and 32-34 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

The Examiner alleges that, with respect to claim 1, it is not clear if the recited "ones of the plurality of recesses" means two recesses, three recesses, or more recesses. To overcome this rejection, Applicant has amended claim 1 to recite that the interconnecting line contacts the surface of the resin layer with an interior of the plurality of recesses along which the interconnecting line passes. By this amendment, Applicant respectfully asserts that claim 1 conforms with 35 U.S.C. § 112, second paragraph.

With respect to claim 2, the Examiner alleges that it is not clear if "a transparent-and-opaque pattern" is defining the same pattern with the recited "a pattern". Notwithstanding, Applicant respectfully asserts that claim 2 has been cancelled and its subject matter has been moved up into independent claim 1. Claim 1 now recites that the mask includes a transparent-and-opaque for irradiating the resin layer with a predetermined pattern that matches the transparent-and-opaque pattern. Again, by this

amendment, Applicant respectfully asserts that the claimed invention now conforms with 35 U.S.C. § 112, second paragraph. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 5-7 and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kikuchi (U.S. Pub. No. 2002/0005568) in view of Yoda (U.S. Pat. No. 2001-144217). This rejection is respectfully traversed.

Claim 1 has been amended and rewritten. Claim 1 now recites that the resin is formed of a photosensitive resin precursor. Claim 1 also recites that photolithography using a mask is applied during the step of forming the plurality of recesses, wherein the mask includes a transparent-and-opaque pattern for irradiating the resin layer with a predetermined pattern that matches the transparent-and-opaque pattern. Lastly, claim 1 now recites that the transparent-and-opaque pattern prevents the photosensitive resin precursor from being completely resolved by controlling an amount of energy applied to the resin layer during photolithography, and the transparent-and-opaque pattern prevents the recesses from penetrating an entire thickness of the resin layer. None of the cited references teach or suggest the claimed method.

That is, none of the cited references teach utilizing a mask including a transparent-and-opaque pattern for irradiating the resin layer with a predetermined pattern that matches the transparent-and-opaque pattern, wherein the transparent-and-opaque pattern prevents the photosensitive resin precursor from being completely resolved by controlling an amount of energy applied to the resin layer during

photolithography. Moreover, none of the cited references teach a step wherein the transparent-and-opaque prevents the recesses from penetrating an entire thickness of the resin layer. In contrast, both Kikuchi and Yoda merely teach using photolithography to form through holes in a resin layer. There is no teaching or suggestion, however, to modify their method to use a transparent-and-opaque pattern, as claimed.

Claims 2-4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kikuchi in view of Yoda, and further in view of Wolf et al ("Silicon Processing for the VLSI Era," Vol. 1, Ch. 12, page 407-409; hereinafter "Wolf"). This rejection is respectfully traversed.

As stated above, neither Kikuchi nor Yoda, either singularly or in combination, teach or suggest the method of claim 1, as amended. With respect to Wolf, it would not have been obvious to modify the methods of Kikuchi and Yoda with the teaching of Wolf's clear and opaque resist layer because Wolf teaches that although a clear and opaque resist layer may be used, the use of such a layer still does not prevent the recesses from penetrating an entire thickness of the resin layer. This is shown, for example, in Figure 1 of Wolf where it can be seen that the use of the clear and opaque mask still does not prevent the resin layer from being etched all the way down to the substrate.

What's more, Applicant respectfully asserts that claim 1 recites that the transparent-and-opaque pattern prevents the photosensitive resin precursor from being completely dissolved by *controlling* an amount of energy applied to the resin layer during photolithography." (emphasis added) That is, by utilizing a mask with a specific,

fine pattern of transparent and opaque portions, the inventors of the present invention realized a way to limit the amount of energy applied to a resin layer to form recesses.

None of the cited references teach or suggest using the pattern itself to control the energy applied to the resin. In contrast, Yoda merely teaches recesses. These recesses, however, can be formed in a multitude of ways including, for example, adjusting a power of the irradiation itself. Further, Wolf does not teach controlling an amount of energy applied to the resin layer because, as stated above, Wolf teaches completely resolving the resin layer with his mask. Because none of the cited references teach or suggest a claim method in its entirety, Applicant respectfully asserts that the claimed invention would not have been obvious in view of the combination of Kikuchi, Yoda and Wolf.

Claims 8-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kikuchi in view of Yoda, and further in view of Ma (U.S. Pat. No. 6,713,859). This rejection is respectfully traversed.

Claims 8 and 9 depend from claim 1, addressed above. These claims are not obvious for at least the same reasons.

Claim 32 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kikuchi in view of Yoda, and further in view of Kida (U.S. Pat. No. 6,313,540). This rejection is respectfully traversed.

Claim 32 depends from claim 1, addressed above. Claim 32 is not obvious for at least the same reasons.

Claim 34 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kikuchi in view of Yoda, and further in view of Kuwabara (U.S. Pub. No. 2002/0008320). This rejection is respectfully traversed.

Claim 34 depends from claim 1, addressed above. Claim 34 is not obvious for at least the same reasons.

Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

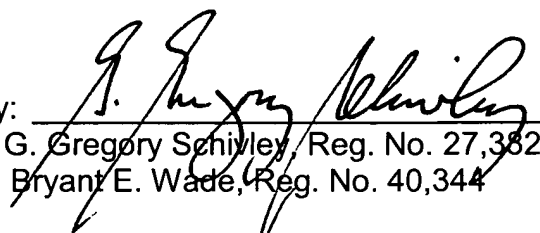
It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: May 22, 2006

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

GGs/BEW/JAH

By: 
G. Gregory Schivley, Reg. No. 27,382
Bryant E. Wade, Reg. No. 40,344